What is claimed is:

1. A magnetic recording disk comprising:

a substrate;

a first lower ferromagnetic layer on the substrate and having a remanent magnetization Mr, a thickness t and a remanent-magnetization-thickness product Mrt:

a ferromagnetically-coupling layer on the first lower ferromagnetic layer;

a second lower ferromagnetic layer on the ferromagnetically-coupling layer and having an Mrt;

an antiferromagnetically-coupling layer on the second lower ferromagnetic layer; and

an upper ferromagnetic layer on the antiferromagnetically-coupling layer and having an Mrt greater than the sum of the Mrt values of the first and second lower ferromagnetic layers.

2. The disk of claim 1 wherein the lower ferromagnetic layers are formed of substantially the same material.

3. The disk of claim 1 wherein the lower ferromagnetic layers have substantially the same Mrt.

4. The disk of claim 1 wherein the ferromagnetically-coupling layer is an alloy comprising Co and Ru, wherein Ru is present in the alloy in an amount greater than approximately 40 atomic percent and less than approximately 70 atomic percent.

5. The disk of claim 1 wherein the ferromagnetically-coupling layer is an alloy comprising Co and Cr, wherein Cr is present in the alloy in an amount greater than approximately 27 atomic percent and less than approximately 45 atomic percent.

6. The disk of claim 1 wherein the ferromagnetically-coupling layer consists essentially of Pt or Pd.

7. The disk of claim 1 wherein the ferromagnetically-coupling layer has a thickness between approximately 0.5 and 5 nm.

8. The disk of claim 1 wherein the ferromagnetically-coupling layer consists essentially of Ru or Cr having an exchange constant greater than approximately 0.02 ergs/cm^2.

9. The disk of claim 1 wherein the ferromagnetically-coupling layer is a first ferromagnetically-coupling layer and further comprising;

a second ferromagnetically-coupling layer on the second lower ferromagnetic; and

a third lower ferromagnetic layer on the second ferromagnetically-coupling layer;

and wherein the antiferromagnetically-coupling layer is formed directly on the third lower ferromagnetic layer and the upper ferromagnetic layer has an Mrt greater than the sum of the Mrt values of the first, second and third lower ferromagnetic layers.

10. The disk of claim 1 wherein the upper ferromagnetic layer is an alloy comprising Co, Pt, Cr and B, and wherein each of the lower ferromagnetic layers is an alloy comprising Co and Cr.

11. The disk of claim 10 wherein each of the lower ferromagnetic layers is an alloy further comprising Ta.

12. The disk of claim 1 wherein the antiferromagnetically-coupling layers is a material selected from the group consisting of ruthenium (Ru), chromium (Cr), rhodium (Rh), iridium (Ir), copper (Cu), and their alloys.

13. The disk of claim 1 further comprising an underlayer located on the substrate between the substrate and the first lower ferromagnetic layer.

14. The disk of claim 1 further comprising a protective overcoat formed over the upper ferromagnetic layer.

15. A magnetic recording disk comprising:

a substrate; and

an antiferromagnetically-coupled structure on the substrate and having two remanent magnetic states in the absence of an applied magnetic field, the structure comprising

(a) a first lower ferromagnetic layer having a remanent magnetization Mr, a thickness t and a remanent-magnetization-thickness product Mrt; (b) a ferromagnetically-coupling layer on the first lower ferromagnetic layer; (c) a second lower ferromagnetic layer on the ferromagnetically-coupling layer and having an Mrt; (d) an antiferromagnetically-coupling layer on the second lower ferromagnetic layer; and (e) an upper ferromagnetic layer on the antiferromagnetically-coupling layer and having an Mrt greater than the sum of the Mrt values of the first and second lower ferromagnetic layers;

and wherein, in each remanent state, the magnetization directions of the first and second lower ferromagnetic layers are substantially parallel to one another and antiparallel to the magnetization direction of the upper ferromagnetic layer, and the magnetization direction of the upper ferromagnetic layer in one remanent state is substantially antiparallel to its magnetization direction in the other remanent state.

16. The disk of claim 15 wherein the lower ferromagnetic layers are formed of substantially the same material.

17. The disk of claim 15 wherein the lower ferromagnetic layers have substantially the same Mrt.

18. The disk of claim 15 wherein the ferromagnetically-coupling layer is an alloy comprising Co and Ru, wherein Ru is present in the alloy in an amount greater than approximately 40 atomic percent and less than approximately 70 atomic percent.

19. The disk of claim 15 wherein the ferromagnetically-coupling layer is an alloy comprising Co and Cr, wherein Cr is present in the alloy in an amount greater than approximately 27 atomic percent and less than approximately 45 atomic percent.

20. The disk of claim 15 wherein the ferromagnetically-coupling layer consists essentially of Pt or Pd.

21. The disk of claim 15 wherein the ferromagnetically-coupling layer has a thickness between approximately 0.5 and 5 nm.

22. The disk of claim 15 wherein the ferromagnetically-coupling layer consists essentially of Ru or Cr having an exchange constant greater than approximately 0.02 ergs/cm^2.

23. The disk of claim 15 wherein the upper ferromagnetic layer is an alloy comprising Co, Pt, Cr and B, and wherein each of the lower ferromagnetic layers is an alloy comprising Co and Cr.

24. The disk of claim 23 wherein each of the lower ferromagnetic layers is an alloy further comprising Ta.

25. The disk of claim 15 wherein the antiferromagnetically-coupling layer is a material selected from the group consisting of ruthenium (Ru), chromium (Cr), rhodium (Rh), iridium (Ir), copper (Cu), and their alloys.

26. The disk of claim 15 further comprising an underlayer located on the substrate between the substrate and the first lower ferromagnetic layer.

27. The disk of claim 15 further comprising a protective overcoat formed over the upper ferromagnetic layer.